of probabilities, the weighting of observations, and the treatment of the figures obtained, but illustrations are deferred until after the chapter on the precision of observations. Some interesting subjects for discussion are appended. The last relates to gambling, and the views of Dr. Burnham, of Chicago, are quoted, who believed that if the laws of chance were taught to children in the schools, they would steer clear of the slot machine in early years, and later would shun the bookmaker and every other gambling magnate. Now, would they? Might not they, even though they had been taught that the value of the chance was only half what they were paying, come to that other conclusion—natural if they have imperfectly understood what they were taught—that the laws of chance are "all theory like the stars," and that with luck they might easily win a big prize?

The third chapter is on "the adjustment of observations,' and here we find more pains taken to explain how observations in general and observations that are not exactly consistent in particular should be dealt with to obtain the best or most likely results.

In the chapter on "the precision of observations" the probability curve is treated graphically, and mean square error, average deviation, and probable error are explained. The next chapter, on the propagation of errors, perhaps most nearly touches the experimental work of the student, for here the relation of error of observation to error of result is discussed. After this, plotting and negligibility are the subjects of two chapters, in the latter of which the slide rule is taken as an example. The concluding chapter is on empirical formulæ and constants.

It will be seen from the tabular statement of the subjects considered that they are of the first importance to the experimentalist. At the same time, unless the student is made to appreciate well both the niceties of the experimental art and the matters dealt with in this book, the latter may, if imperfectly understood, be a source of danger. The student may not appreciate the futility of overloading a multitude of bad observations, subject of necessity to consistent errors, with sheets of least square calculations. If he has more aptitude for figures than for experiment, he may even delude himself into believing that his calculated probable errors really are probable errors. In such cases it is much more important to spend the time required for these calculations in improving his apparatus or varying his method so as, so far as possible, to avoid consistent errors. Two or three experiments really well conducted are worth far more than a multitude performed in a slovenly way, and no scientific juggling will give the multitude more value. The writer feels that this aspect of the general question is not sufficiently insisted on, and the book, in spite of its many excellent features, would be more valuable to the student if the author had condescended to give more attention to the actual operations of the laboratory and their relation to the consequent calculations.

C. V. Boys.

"SPOTTED FEVER."

Cerebro-spinal Fever. By Dr. Michael Foster and Dr. J. F. Gaskell. Pp. x+222. (Cambridge: At the University Press, 1916.) Price 12*s.* 6*d.* net.

THIS excellent and complete monograph of the much-dreaded disease, cerebro-spinal fever—dreaded because of its high mortality and incapacitating sequelæ—should prove of great interest not only to the members of the medical profession but to men of science generally.

The book is dedicated by the authors to the memory of their respective fathers, and on account of its careful, lucid, scientific, yet withal practical, exposition of the subject it is a worthy tribute to those two great founders of the modern school of English physiology.

The authors claim that this monograph has for its aim an attempt to bring together and correlate the clinical and pathological facts which they were enabled to accumulate during the epidemic of 1915 in the Eastern Command, and the views set forth are the outcome of clinical and pathological observations made in the wards, the laboratory, and the post-mortem room of the 1st Eastern General Hospital.

There are eleven chapters and two appendices, and the excellent plan of giving a summary in italics of the principal facts dealt with in each chapter is helpful to the reader. There are eleven excellent plates, eight of which are coloured. The work commences with an interesting historical account of the disease—largely a summary from the exhaustive treatise by Hirsch on Geographical and Historical Pathology. The first authentic account of an epidemic is that which occurred in Geneva in 1805. From the date of this, its first appearance, the disease was epidemic at various places both in Europe and America. Read in the light of modern knowlege of carriers in the propagation of disease, we can understand how this disease suddenly appeared and travelled according to no appreciable law.

Prior to 1915 cerebro-spinal fever in an epidemic form had been confined in Great Britain to the industrial centres of Scotland and Ireland. The authors point out that although the naso-pharynx is the location in which the specific organism is to be found, yet, according to their experience, it may be present without causing any marked inflammatory condition of the mucous membrane. Consequently, carriers may appear to be healthy persons; and it is not surprising, therefore, that when, in 1915, large numbers of soldiers were crowded into huts and billets with deficient ventilation and other favouring conditions, outbreaks of the disease should have occurred not only among the soldiers but also among civilians. Serious epidemics occurred at Salisbury Plain, Aldershot, in the London area, and in the eastern counties of England. A good account of the symptomatology, diagnosis, and treatment of the disease is given. Four excellent coloured plates illustrate the four distinct varieties of rash, and

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the statement of the authors may be noted that in their 39 cases a rash was present in 22.

The symptoms due to the inflammation of the meninges, viz., severe headache, vomiting, retraction of the head and neck, stiffness of the neck, and the presence of Kernig's sign, are common to all forms of meningitis. But the presence of the rash, and the discovery of the *Meningococcus (diplococcus) intracellularis* in the cerebro-spinal fluid after withdrawal by lumbar puncture, constitute the essential differential diagnostic signs. Excellent photographs are given illustrating cases exhibiting the head retraction and Kernig's sign; also remarkably well-executed coloured plates illustrating the macroscopic appearances presented by the brain and spinal cord, and the microscopic appearances of the meninges and the cerebro-spinal fluid containing the *diplococcus intracellularis*.

Various statistics are quoted which appear to prove that the authors are right in asserting that frequent lumbar puncture is the most valuable therapeutic measure, and that it is not enhanced by subsequent intrathecal injection of Flexner's serum. In fact, they state: "In our somewhat limited experience the introduction of serum caused, for the most part, a decided aggravation of cerebral symptoms." An excellent chapter on the pathology of the disease follows, in which the authors discuss the channels by which the diplococcus passes from the naso-pharynx to the subarachnoid space. This is followed by a chapter on changes in the cerebro-spinal fluid and the cultivation of the meningococcus from it, from the blood, and from the urine. The last fifty pages are devoted to an exhaustive account of the epidemiology and bacteriology, in which are discussed the contagion direct from throat to throat, the mode of examination of carriers, and their treatment by isolation and local applications to the throat and nose. In conclusion, there is an appendix containing a remarkable example of the spread of the meningococcus from carrier to carrier.

A MONOGRAPH ON TICKS.

Ticks. A Monograph of the Ixodoidea. Part iii. *The Genus Haemaphysalis.* By Prof. G. H. F. Nuttall and C. Warburton. October, 1915. Pp. xiii + 349–550 + plates viii–xiii. (Cambridge: At the University Press.) Price 12*s.* net.

Bibliography of the Ixodoidea. Part ii. May, 1915. By Prof. G. H. F. Nuttall and L. E. Robinson. Pp. 32. (Cambridge: At the University Press.) Price 4*s.* 6*d.* net.

THE present part of this useful monograph deals with the fifty species and varieties of Hæmaphysalis recognised as valid by the authors. The distinguishing features of the genus are stated and discussed, and the difficulty is noted of finding, among the many negative characters in this genus, points which can be employed for differentiating the species. Nevertheless, the authors have succeeded in drawing up a helpful dichotomic key for the determination of the species. The species are then considered in turn, and, as in the two previous parts of the monograph, careful drawings are given of those parts which are of systematic importance. Interesting conclusions are reached from a study of the geographical distribution of the different species; *e.g.*, that *H. bispinosa* has almost certainly been imported into East Africa, and possibly into New South Wales, with Indian cattle. Only one species of Haemaphysalis appears to be restricted to birds, whereas several species of Ixodes are found only on birds. The authors give a list of hosts on which the various species of Hæmaphysalis have been found, and discuss the condemned and doubtful species. An account is given of all that is known regarding the biology of six species, two of which have been proved to be the carriers of pathogenic protozoa, one especially—*H. leachi*—being known in many parts of Africa as the carrier of a fatal disease—canine piroplasmosis or malignant jaundice.

The bibliography (462 titles) contains references to, and in many cases short notes on the nature and contents of, papers which for the most part have appeared since the publication of the previous bibliography in 1911.

OUR BOOKSHELF.

Newsholme's School Hygiene. The Laws of Health in relation to School Life. New edition, rewritten for all School Workers, by Dr. J. Kerr. Pp. 352. (London: G. Allen and Unwin, Ltd., n.d.) Price 4*s.* 6*d.* net.

NEWSHOLME'S text-book on school hygiene first appeared in 1887, and in 1912 it reached its thirteenth edition. That fact is sufficient evidence of the appreciation it has met with; but circumstances have not made it possible for Dr. Newsholme to continue to develop the work so as to keep it abreast of the rapid advance of the science of school hygiene and the extension of its practice which recent years have witnessed. Hence it became desirable that the text-book should be rewritten by one who, like Dr. James Kerr, has played a more prominent part in these developments. The result is a text-book possessing much merit, and embodying facts and opinions based upon a large amount of experience and research.

It seems from a perusal of the first paragraph that the book is more particularly designed for school-teachers, but to such it will be more satisfactory when Dr. Kerr is able in the next edition to bring his exceptional knowledge and experience to bear upon a fuller treatment of some matters of importance; for while the book is (generally speaking) well balanced in its treatment of the subject-matter, it is in places much too brief. To

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